

Integrated GNSS Master (IGM)

Easily Bring GNSS PTP Timing Indoors

Overview

The synchronization required for indoor small cell operations requires a high accuracy timing receiver nearby, and up until now that required an expensive, and often complicated GNSS antenna installation for a relatively few number of small cells. Solving this big problem in delivering precise GNSS based time to small cell deployments is the revolutionary Microsemi Integrated GNSS Master (IGM) that easily brings the GNSS timing indoors. The IGM (Integrated GNSS Master) fully integrates a PTP Grandmaster with a GNSS receiver and antenna in a small, fully contained package designed to attach to an inside wall.

The Microsemi IGM does not use an external antenna and therefore significantly reduces the expenses related to purchasing, installing and maintaining external GNSS cable systems required for typical GNSS timing receivers. Furthermore, the IGM uses Power over Ethernet (PoE) to further simplify installation. Simply mount the IGM on the wall, preferably near a window, connect to the network via PoE and the unit will automatically self configure via TR-069, lock to GNSS signals and begin PTP Grandmaster operations. No on premise user configuration required.



Problem to Solve

LTE-TDD, LTE-A and also LTE-FDD that implements applications which require tight coordination (eICIC, CoMP, etc) require very tight, UTC aligned phase synchronization. The only sensible solution to provide this level of phase synchronization is via GNSS PTP grandmaster timing systems. GNSS timing systems require an antenna to pick up the satellite signals. Due to the very low power of these signals an external GNSS antenna, often mounted on the roof for indoor small cells, has been the primary technique for signal acquisition. The problem is that indoor small cells needing synchronization are by nature often installed in areas of very low cellular and GNSS signal strength. The needed GNSS timing receiver must then often run a very long and expensive cable to the roof of the building to support the few small cells within.

In tall multi floor buildings running an antenna cable to the roof is either very expensive or not an available option. The antenna installation costs which often include expensive permits, labor, material, monthly roof rental fees and more can quickly exceed the cost of the GNSS PTP grandmaster and small cells alone. What is needed is a quick and simple solution to bring the accurate PTP grandmaster timing closer to the small cells.



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Solution: Integrated GNSS Master

The Microsemi indoor wall mounted IEEE-1588 IGM Grandmaster with integrated GNSS receiver and antenna eliminates the external antenna with its expensive related cabling costs entirely. A singular Ethernet connection is used for auto configuration management, PoE to the IGM as well as PTP grandmaster operations to precisely synchronize the small cells in the building. The innovative and extremely sensitive GNSS receiver and patented Microsemi timing algorithms result in a revolutionary indoor GNSS timing solution proven to work in many different indoor environments. The plug and play operation leveraging DHCP and TR-069 communication to the Auto Configuration Server (ACS) is meant for quick and easy installation similar to installing a typical indoor Wi-Fi antenna hot spot. Once installed the IGM locks to GNSS signals and provides the accurate and precise PTP grandmaster synchronization needed for optimum small cell operations.

Benefits Include:

- Reduced Installation Costs & Simplified Cabling
- Enhanced Indoor GNSS performance
- Capture GNSS signals when deployed indoor and/or in deep urban canyons in GNSS rich environment
- Plug-and-Play features reduce deployment time and cost (auto discovery, configuration)
- Best in Class Sync Solution
- Reliability (no external environmental challenges)
- Deployment Flexibility (small size, wall mount, indoor)

Integrated GNSS Master IGM Attributes

- Small form factor with single 1GBE RJ45 port
- G.8265.1 (L3 unicast), G.8275.1 (L2 multicast)
- One step clock
- SyncE hardware support
- Support [0-7] CoS as per 802.1q
- 802.1q VLANs at 1 per PTP Client
- GNSS receiver with assisted GNSS support
- GPS and Glonass – Beidou, SBAS, Galileo ready
- Time to First Fix (TTFF) of 10 minutes to less than 1 hour until system lock

Management

- In band via Ethernet port
- IPv4

Management (continued)

- TimePictra support through SNMP, fault only
- TR-069 configuration
- SNMP V2/V3
- Internal Log

Outputs

- PTP Grandmaster
- Test Point
- SyncE

Diagnostics

- Alarms: SNMP traps
- LEDs: Sync, Network, Alarm

Plug & Play

- Auto-configuration via TR-069 to ACS
- Communicate with external servers (DHCP, A-GNSS, ACS, etc).
- Minimal manual intervention with basic tools for deciding best placement of unit

Redundancy

- Achieved by deploying 2 or more IGM units at a site with client fail-over capabilities

Power

- PoE Class 3 input
- Power < 13 Watts

Capacity

- 4 to 8 unicast slaves @ 128 pkt/sec

Installation

- Indoor Mounting: Vertical wall mount

Regulatory & Environmental

- Operating 0C to 50C (operating), 5 to 90% non-condensing
- Storage -40 to 70C
- ETSI/CE Mark, FCC Class B, Low Voltage Directive 72/23/EEC, EN55022 Class B, CISPR 22 Class B
- EN 300386, EN 60950-1 (Safety) with CB Scheme, EN 300019-1-3 Class 3.1 Temperature Controlled Environments

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